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No-tillage, Strip-tillage, and Chisel Plow Tillage Trial

Mark A. Licht
Iowa State University, lichtma@iastate.edu

Zachary A, Koopman
Iowa State University, zkoopman@iastate.edu

Kent R. Berns
Iowa State University, krberns@iastate.edu

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Abstract
Farmers in central and north central Iowa are often criticized for low adoption of no-tillage systems. No-tillage is often faulted with cooler, wetter soils and subsequently reduced yields. An alternative to conventional tillage and no-tillage systems is strip-tillage where the benefits of both are combined

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Mark Licht, extension field agronomist
Zachary Koopman, ag specialist
AEA Research Farm
Kent Berns, superintendent
Central Iowa Research Farms

Introduction

Farmers in central and north central Iowa are often criticized for low adoption of no-tillage systems. No-tillage is often faulted with cooler, wetter soils and subsequently reduced yields. An alternative to conventional tillage and no-tillage systems is strip-tillage where the benefits of both are combined.

Materials and Methods

This trial was conducted in 2011 with the strip-tillage and chisel plow tillage being applied in the falls of 2010 and 2011. In both the strip-tillage and chisel plow treatments, 200 lb N/acre was applied as anhydrous ammonia at the same time as tillage. Urea ammonium nitrate was applied at the rate of 200 lb N/acre at V5 stage corn for the no-tillage treatment. No additional phosphorus and potassium was applied based on soil test levels for the plot area. Pioneer 33W84 was planted on May 6, 2011 at 34,000 seeds/acre. On May 14, 2012, Pioneer 1162AM was planted at 36,000 seeds/acre. In both years the prior crop was corn. Each plow was 30 ft wide by 450 ft long.

Yields were collected using a John Deere 9410 with a Harvest Master weigh system. Additional data collection included residue cover at planting, emergence rate index, spring and fall plant population counts, plant height at V6, and grain moisture.

Results and Discussion

The results of this trial indicate spring and fall plant populations were not significantly different between the tillage systems. Early season plant height at the sixth leaf stage indicated better early season growth from the strip-tillage system compared with the no-tillage system in both years.

Any slight advantage that early season growth had for the strip-tillage system did not result in significant grain yield differences between tillage systems in 2011. However, yields were significantly greater for strip-tillage and conventional tillage compared with no-till in 2012.

Table 1. Residue cover, spring and fall plant populations, emergence rate index, early season plant height, grain moisture and grain yield for three tillage systems at the ISU Johnson Farm south of Ames, Iowa in 2011 and 2012.

Year	Treatment	Residue cover	Spring plant population	Emergence rate index	Plant height	Fall plant population	Grain moisture	Grain yield
		(%)	(plants/ac)		(in.)		%	(bu./ac)
2011	No-tillage	76	31,875	10.6	17.5	30,438	21.9	168.4
	Strip-tillage	71	32,625	12.5	21.9	30,750	19.1	165.1
	Conv. tillage	24	30,625	10.8	20.0	29,375	19.7	172.6
	Pr > F	0.001	0.275	0.128	0.006	0.820	0.007	0.356
2012	No-tillage	48	32,380	12.0	18.0	36,000	23.1	154.6
	Strip-tillage	27	37,000	15.1	22.3	33,500	21.9	172.7
	Conv. tillage	15	35,000	14.2	21.6	33,500	22.3	173.3
	Pr > F	0.001	0.89	0.003	0.001	0.450	0.004	0.050